Sediment and Chemical Loadings in Major Tributaries to Newark and Raritan Bays, New Jersey

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Goal- **To determine the loads of sediment and COCs to Newark and Raritan Bays at the Heads-of-Tide of the major New Jersey tributaries.**

Develop-

- **A representative composition of each river for baseflow and storm events**
- **A method to calculate an average yearly load**
- **A chemical fingerprint of each tributary**

Benefits

- Baseline chemistry of rivers
- Sediment loads to harbor
- Boundary input of sediment and chemistry for models
- Methods for TMDL monitoring/calculations
- Sampling and analytical methods

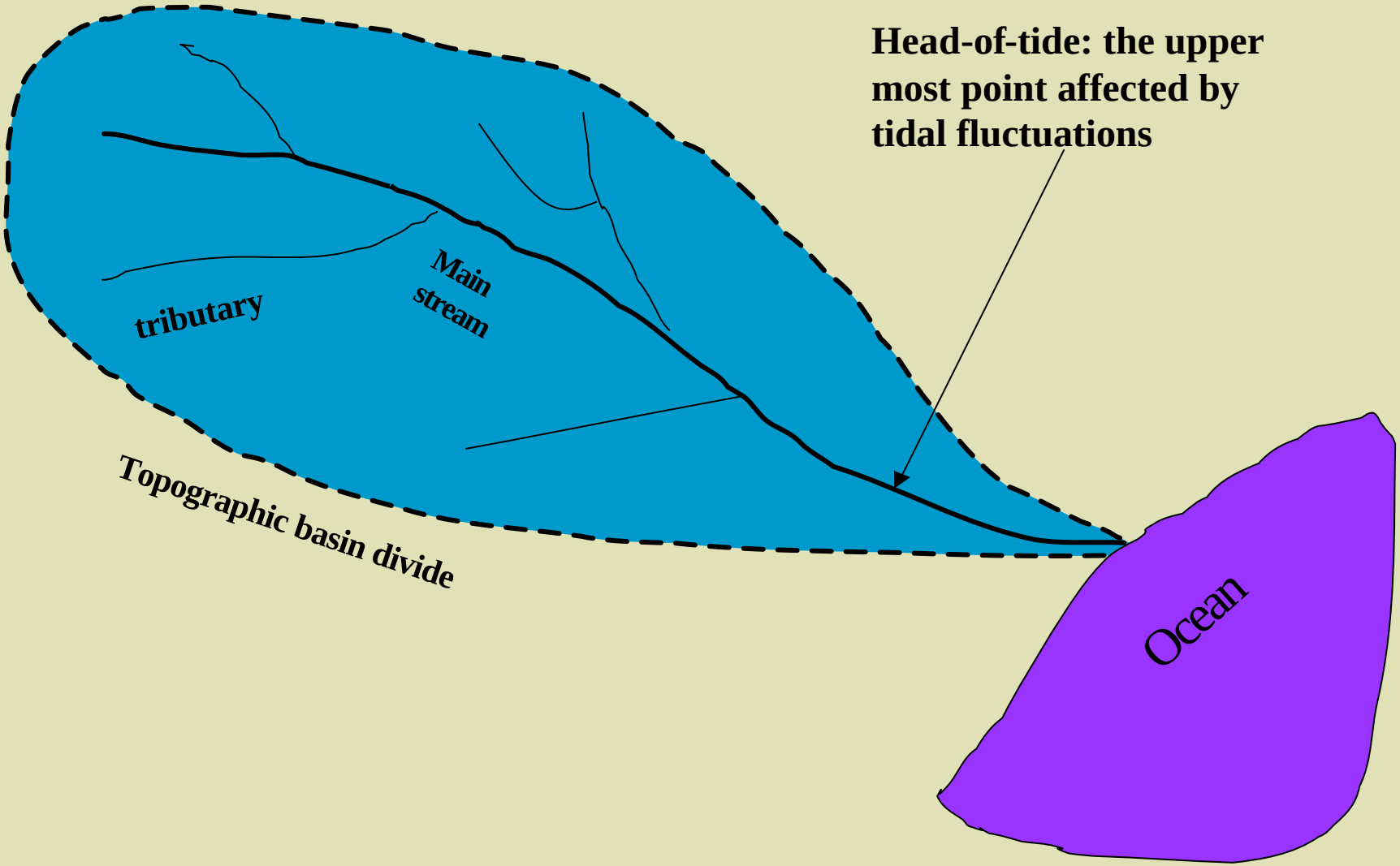
Chemistry at heads-of-tide represents all inputs in the basin from upstream sources

May change over the course of a storm event

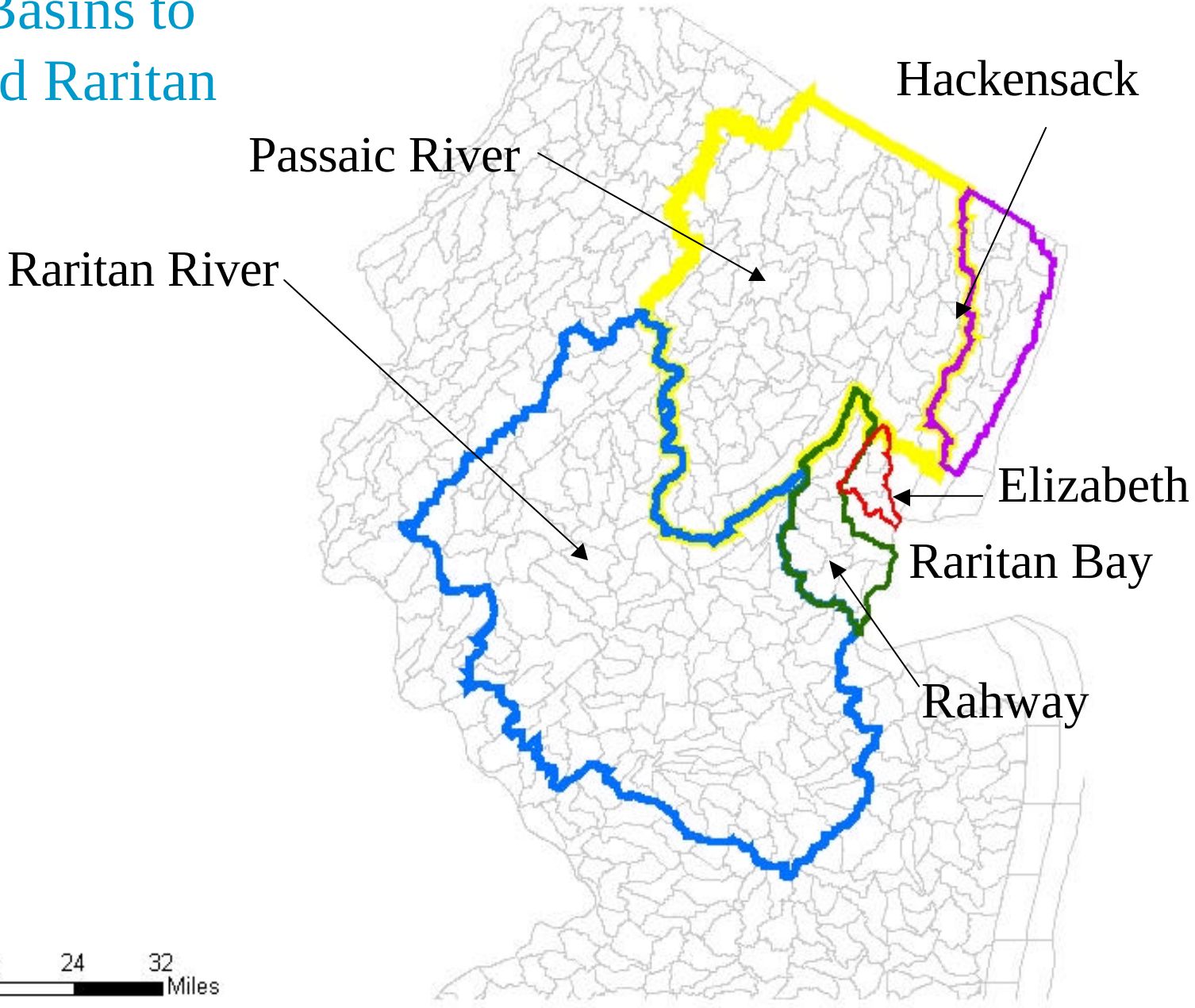
Sources of Sediment and Chemicals –

- **Industrial Discharges**
- **POTW, CSO, and Storm Drains**
- **Agricultural and Residential Runoff**
- **Groundwater Inputs**
- **Atmospheric Deposition**

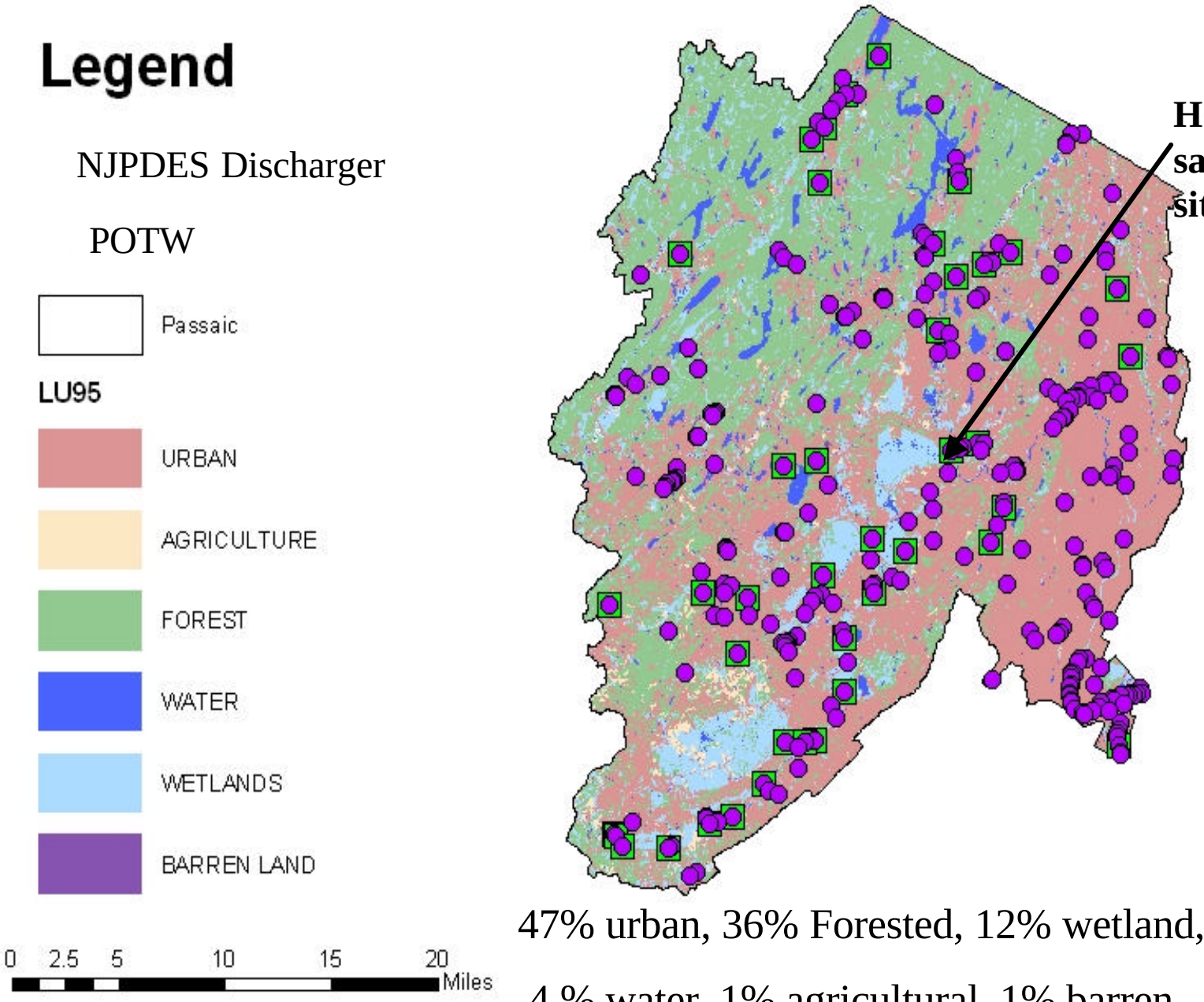
Head-of-Tide Sampling



Tributary Basins to Newark and Raritan Bays



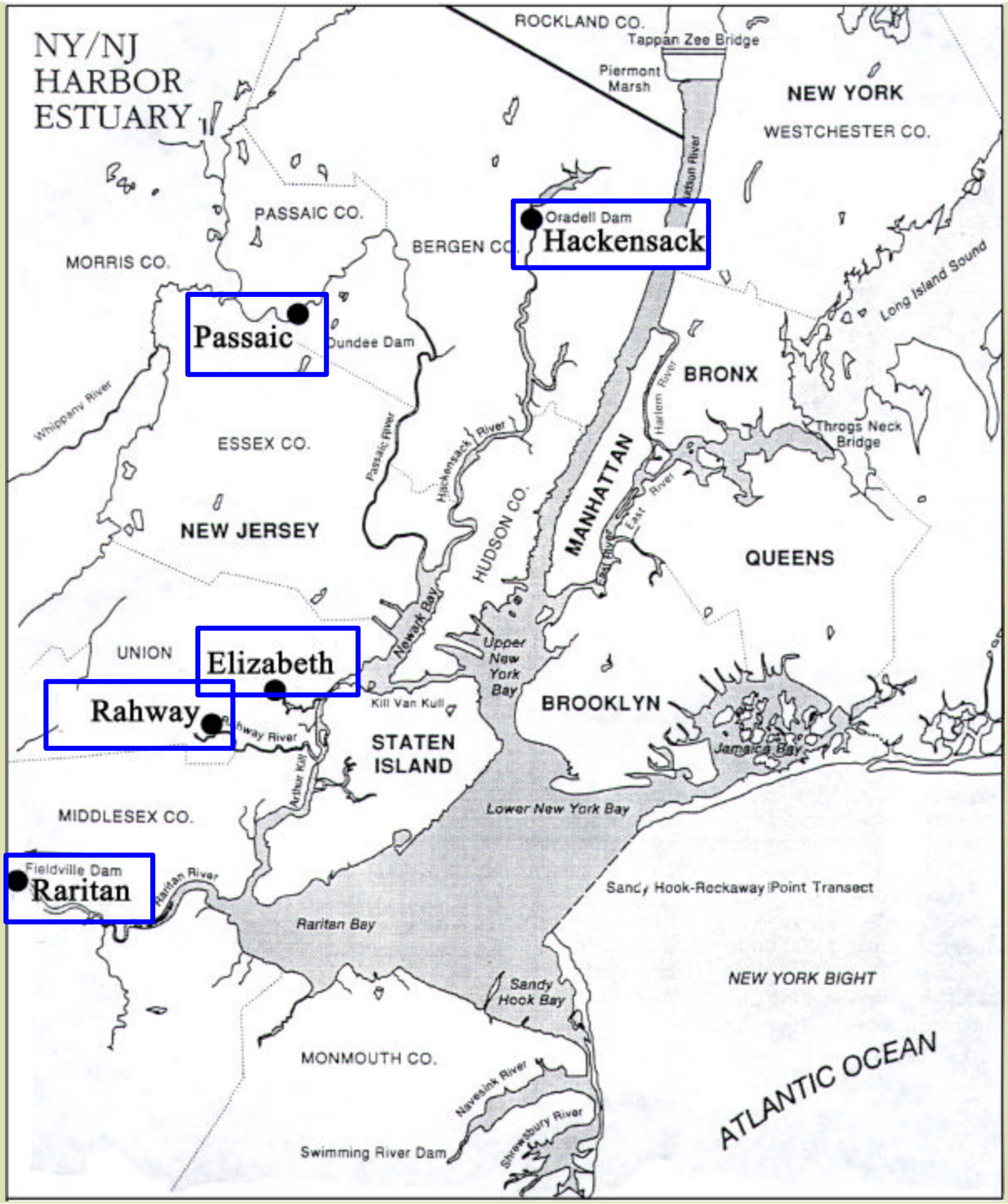
Passaic River Basin – 762 mi^2



47% urban, 36% Forested, 12% wetland,

4 % water, 1% agricultural, 1% barren

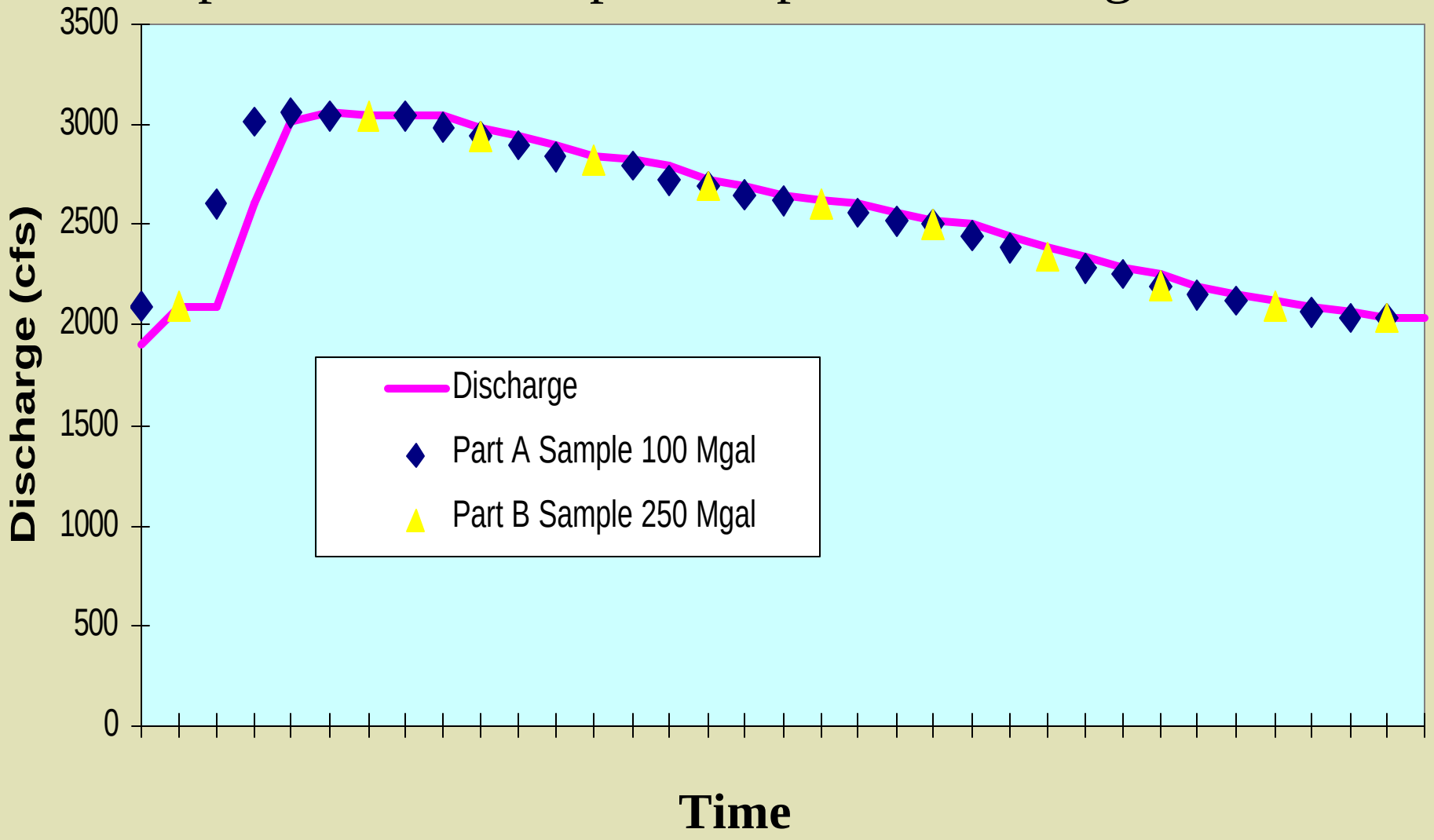
Location of USGS Sampling Sites



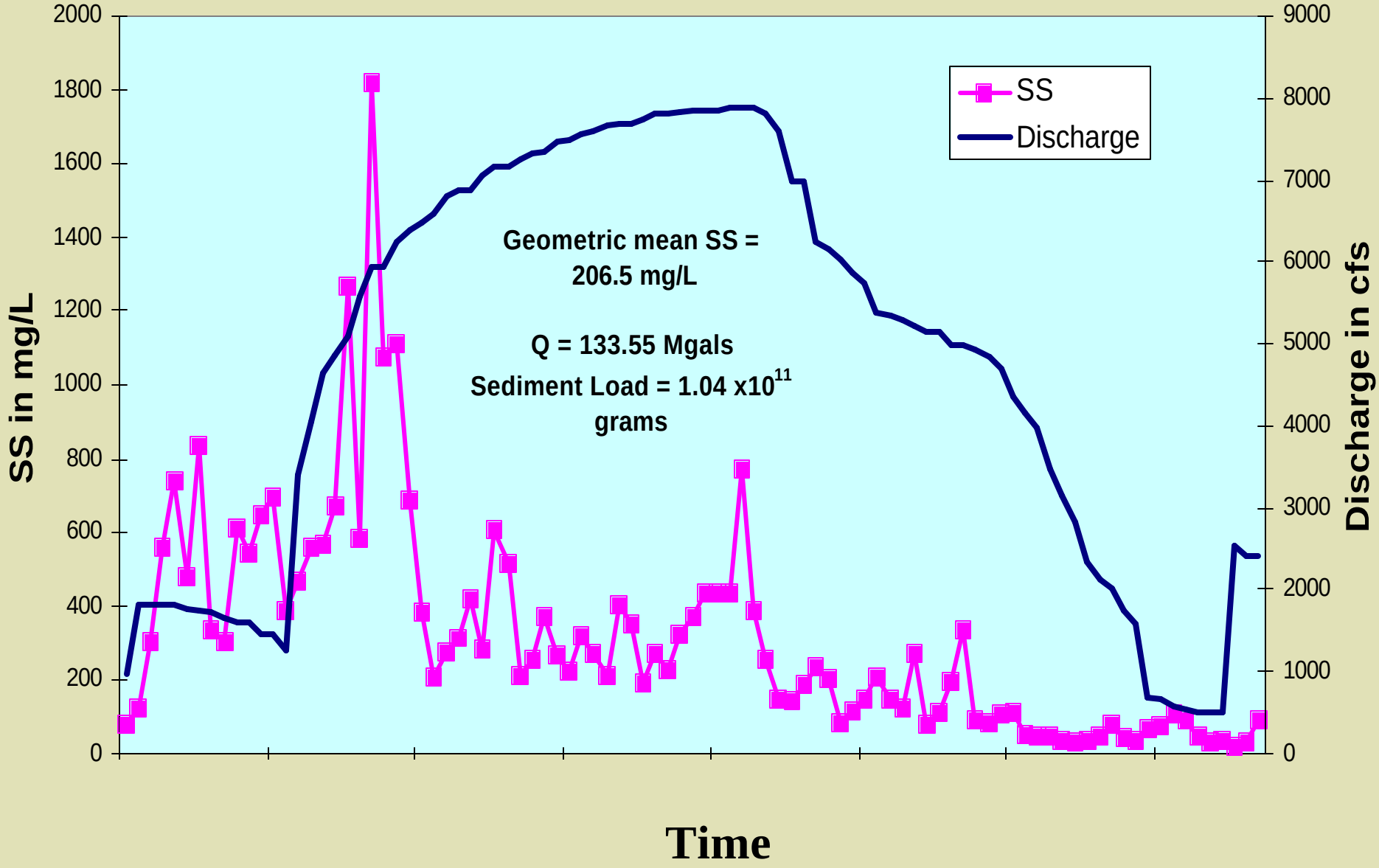
Automatic Samplers

Produce flow-weighted samples for PCBs, dioxins/furans, PAHs, pesticides, and discrete grab samples for SS, carbon, and metals.

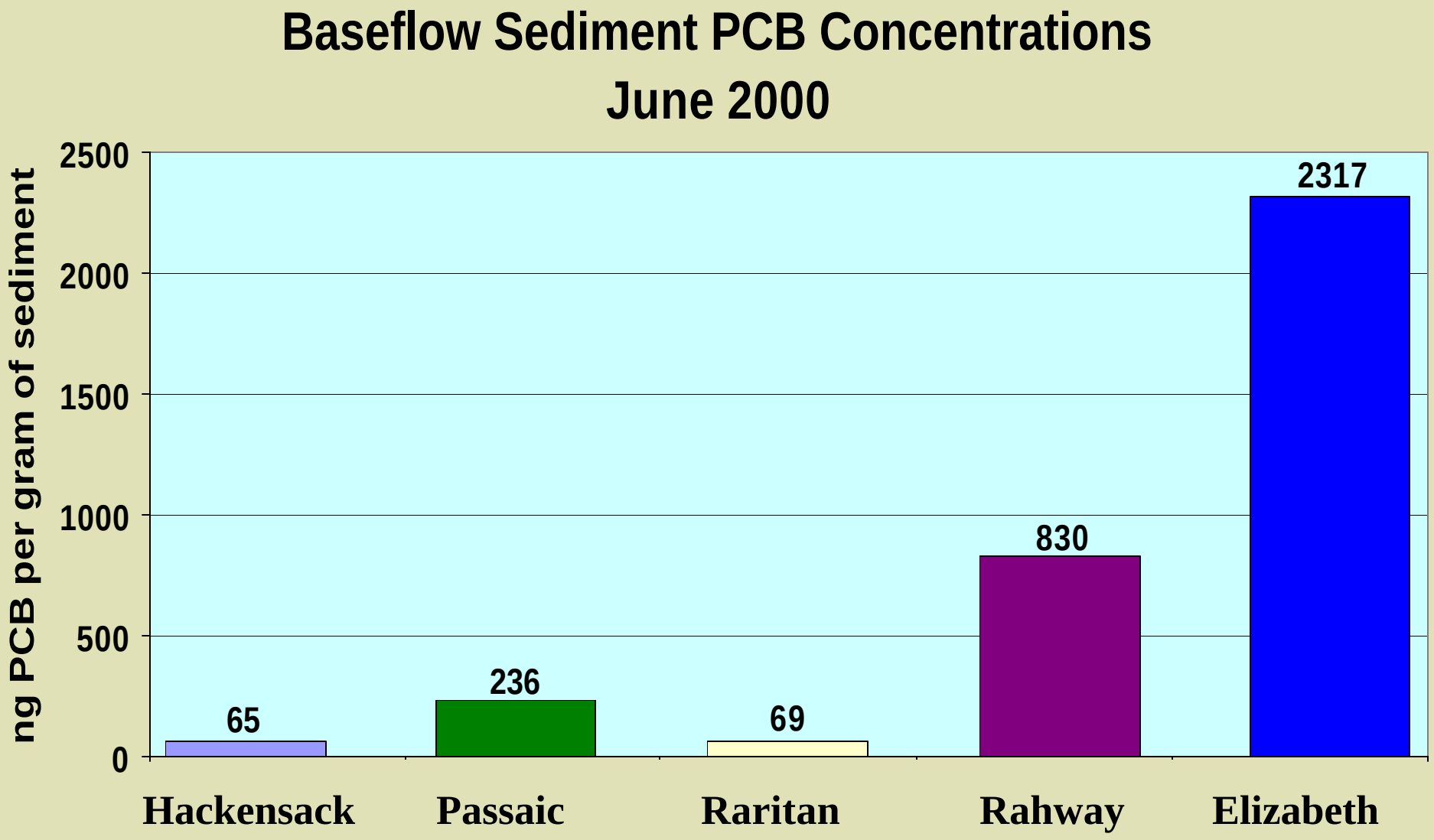
Flow-Weighted Samples - needed to produce the representative sample composition during storm events.



Raritan River at Bound Brook NJ March 18-27, 2002

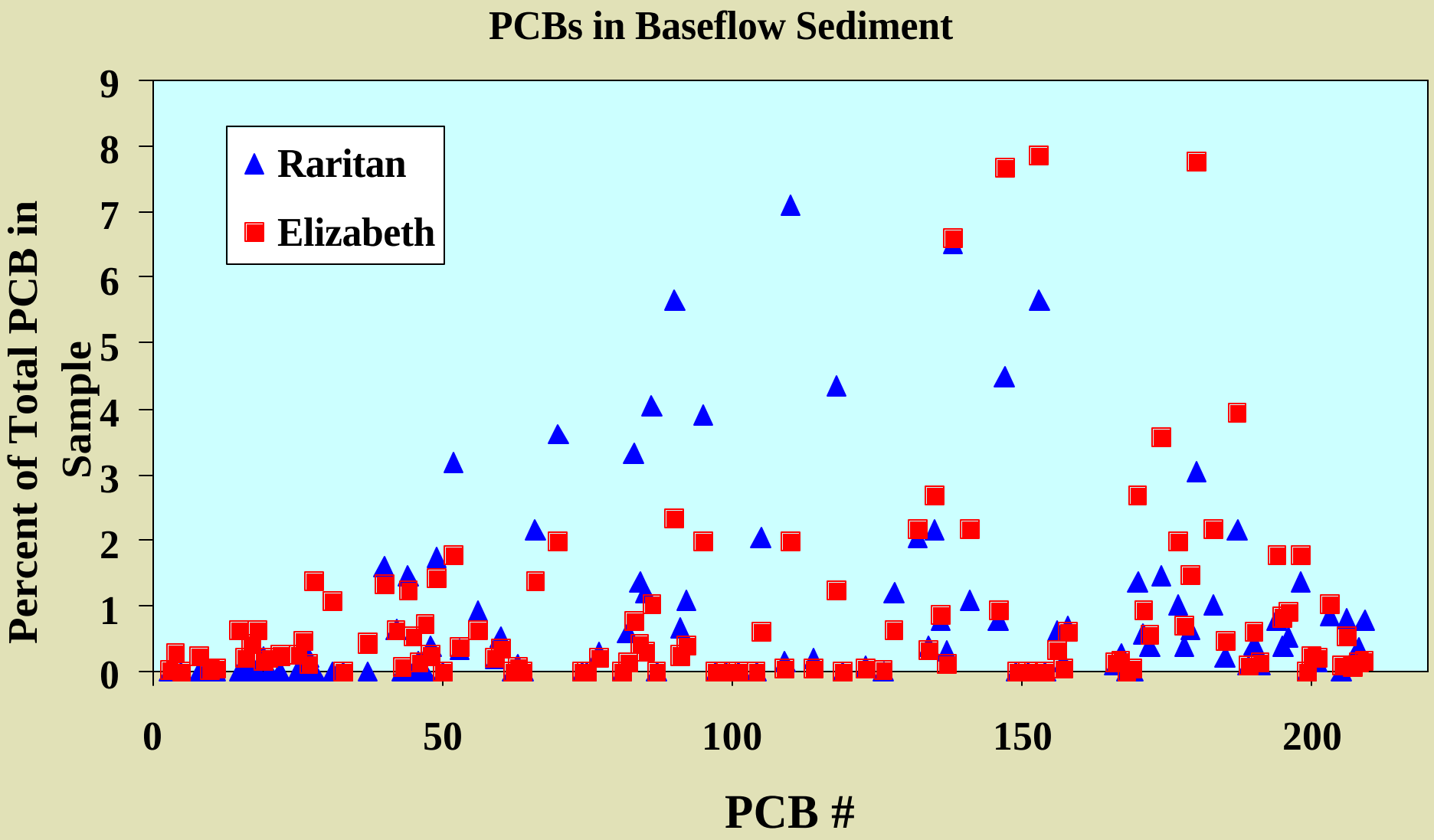


Absolute Concentrations – Show the contribution of each river, provide a baseline for evaluating downstream areas as sources or sinks

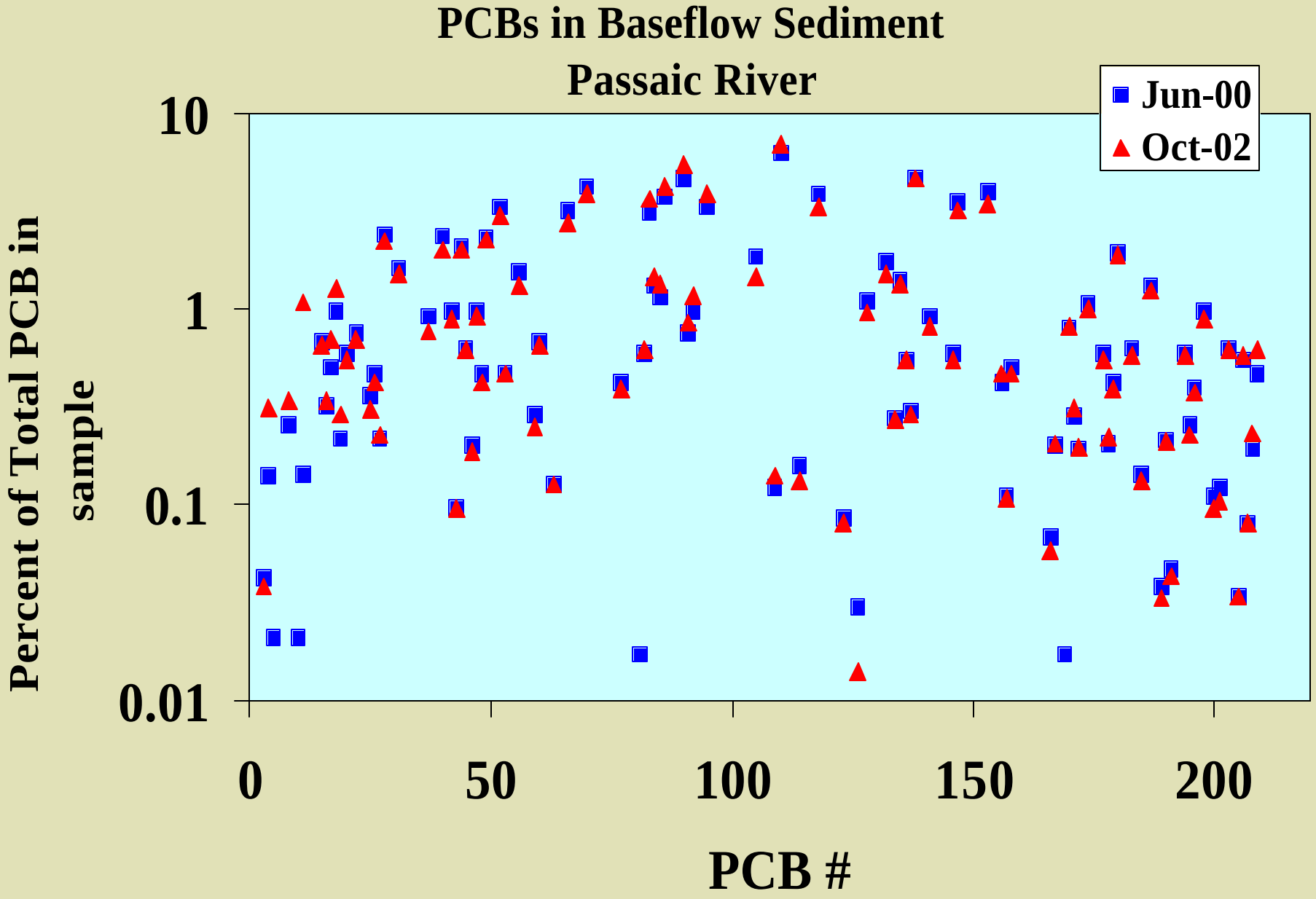


RELATIVE CONCENTRATIONS - used to produce chemical "finger print"

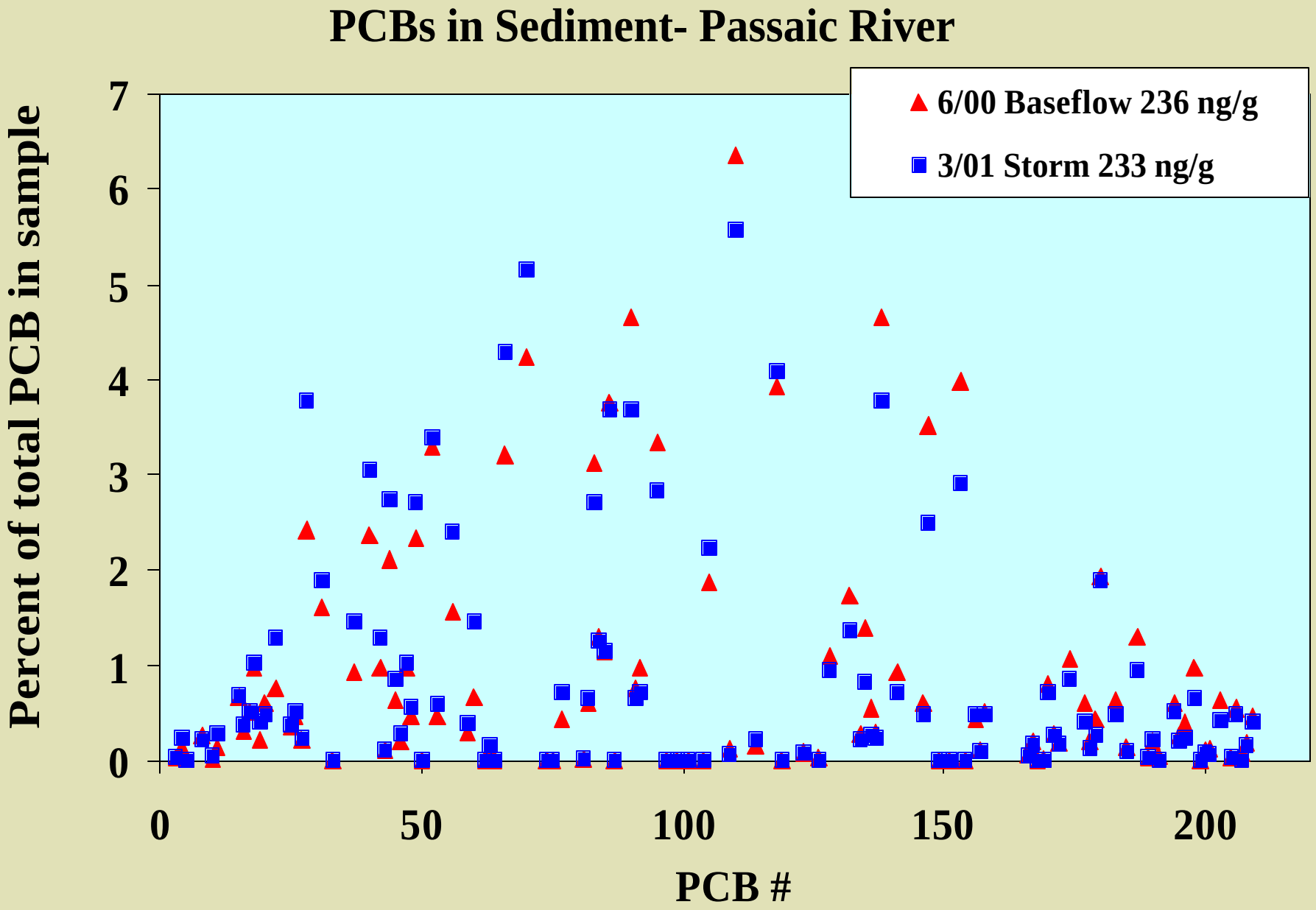
- Compare among rivers



Comparison within rivers



Storm versus Baseflow



Calculating Loads-

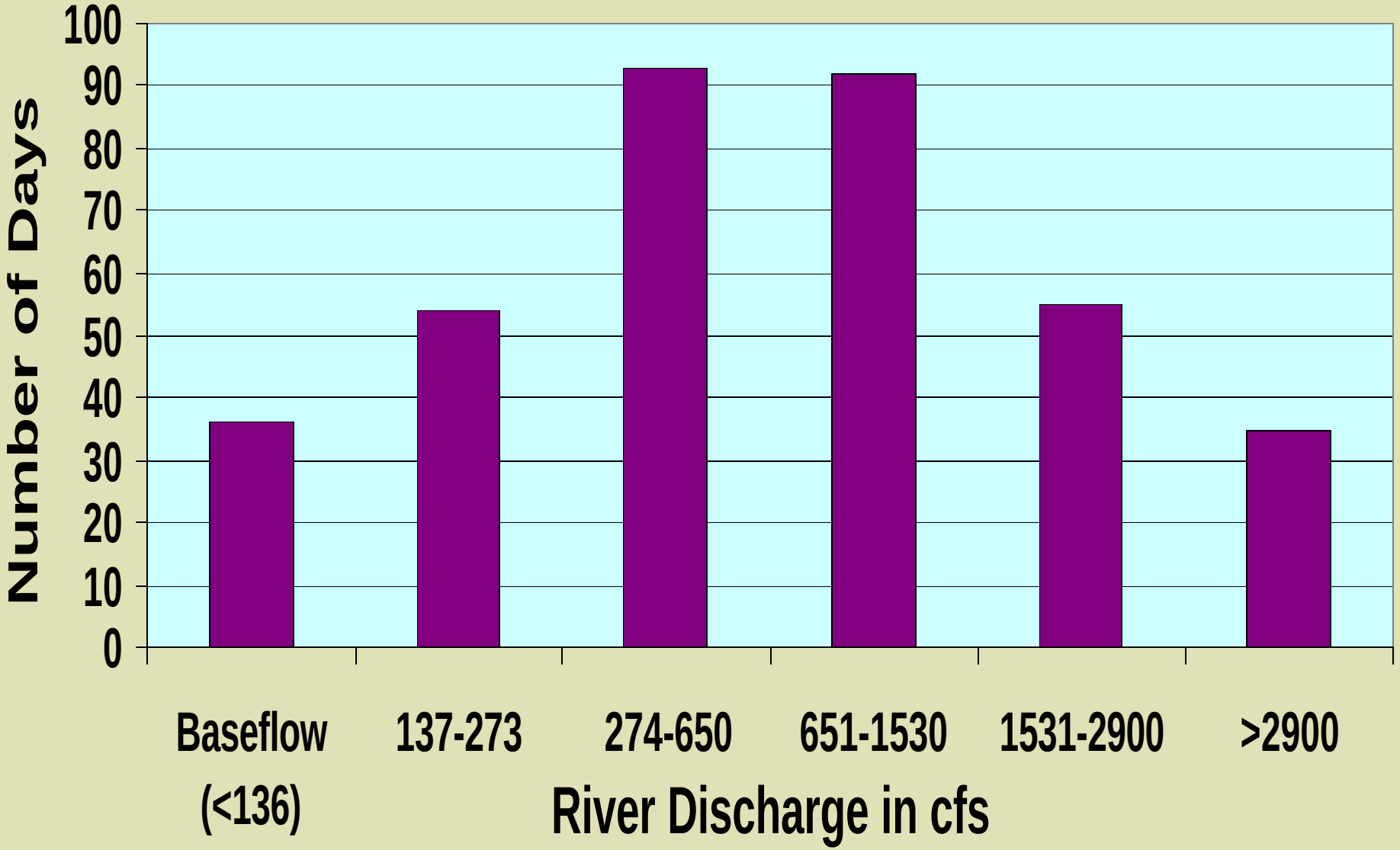
Load = mass * discharge

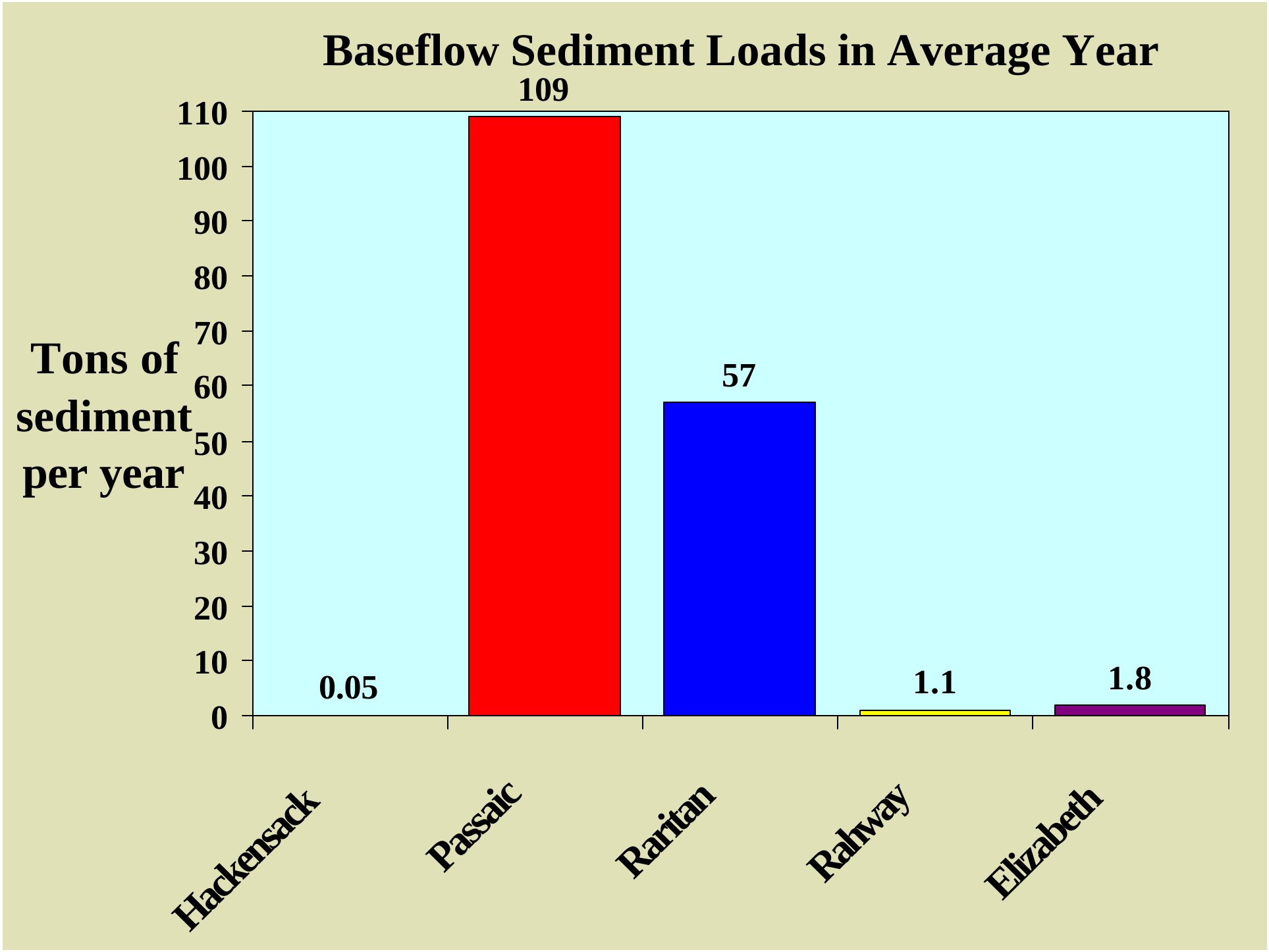
Develop for “average year” or any other time period of interest

Characterize the sediment and chemical composition of a river during base flow, and during storms of different magnitudes

Total Load = (baseflow load) + Σ (storm loads)

An "Average" Year on the Passaic River at Little Falls, NJ




Baseflow Sediment Loads in Average Year
Tons of sediment per year
110
100
90
80
70
60
50
40
30
20
10
0
109
57
0.05
1.1
1.8
Hackensack
Passaic
Raritan
Rahway
Elizabeth

Large vs. Small Rivers – Storm Loads

	Raritan 4/01	Elizabeth 5/01
Volume of water	3003 Mgal	118 Mgal
Mean SS Concentration	31 mg/L	50 mg/L
PCB Concentration	58 ng/g PCB	838 ng/g PCB
Mass of Sediment (dry weight)	393 Tons	11 Tons
Volume of Sediment	179 yds^3	5 yds^3
Grams of PCB	21 g PCB	8 g PCB

Storm vs. Baseflow Load – Raritan River

	Baseflow 6/00 3 days	Storm 4/01 3 days
Volume of water	326 Mgal	3003 Mgal
Mean SS Concentration	3 mg/L	31 mg/L
PCB Concentration	69 ng/g	58 ng/g
Mass of Sediment (dry weight)	4.1 Tons	393 Tons
Volume of Sediment	3.2 yds^3	179 yds^3
Grams of PCB	0.26g PCB	21 g PCB

Further Work –

1. Continue to determine ***concentrations of chemicals*** during storms of differing magnitudes
2. Continue to determine ***sediment loads*** during storms of differing magnitudes
3. Determine loads in minor tributaries